NOVEMBER 2016

Missouri Forest Health 2016 Update

FROM THE MISSOURI DEPARTMENT OF CONSERVATION FOREST HEALTH PROGRAM

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Thousand Cankers Disease

Thousand cankers disease (TCD) remains a threat to eastern black walnut in Missouri. TCD is believed to occur primarily when the walnut twig beetle, *Pityophthorus juglandis*, attacks walnut trees, spreading the fungus *Geosmithia morbida* which causes small cankers in the phloem tissue under tree bark, eventually causing dieback and mortality.

TCD has not been detected in Missouri. However, there is concern that undetected TCD infestations could be present or that spread may occur when infested walnut wood is moved from other states, especially those where TCD has been detected. TCD has been detected in most western states, Maryland, North Carolina, Ohio, Pennsylvania, Tennessee, and Virginia. In Indiana and Michigan, walnut twig beetles have been detected in traps, but no trees positive for TCD have been found. In Illinois and a separate Indiana location, *G. morbida* has been detected on other species of insects, but no walnut twig beetles or TCD positive trees have been found. The Missouri Department of Agriculture has enacted a quarantine prohibiting walnut wood products and all hardwood firewood from coming into Missouri from states where TCD has been detected.

In Missouri, TCD is unlikely to be detected until several years after introduction, making reports of walnut tree dieback and decline very important. See the Missouri Invasive Forest Pest Council website treepests.missouri.edu for more information on what to look for and how to report a suspect tree. Missourians are encouraged to report suspect trees via the online reporting form at treepests.missouri.edu. Photos of suspect trees can also be emailed to **forest.health@mdc.mo.gov** as a first step in determining what trees should be visited by trained personnel.

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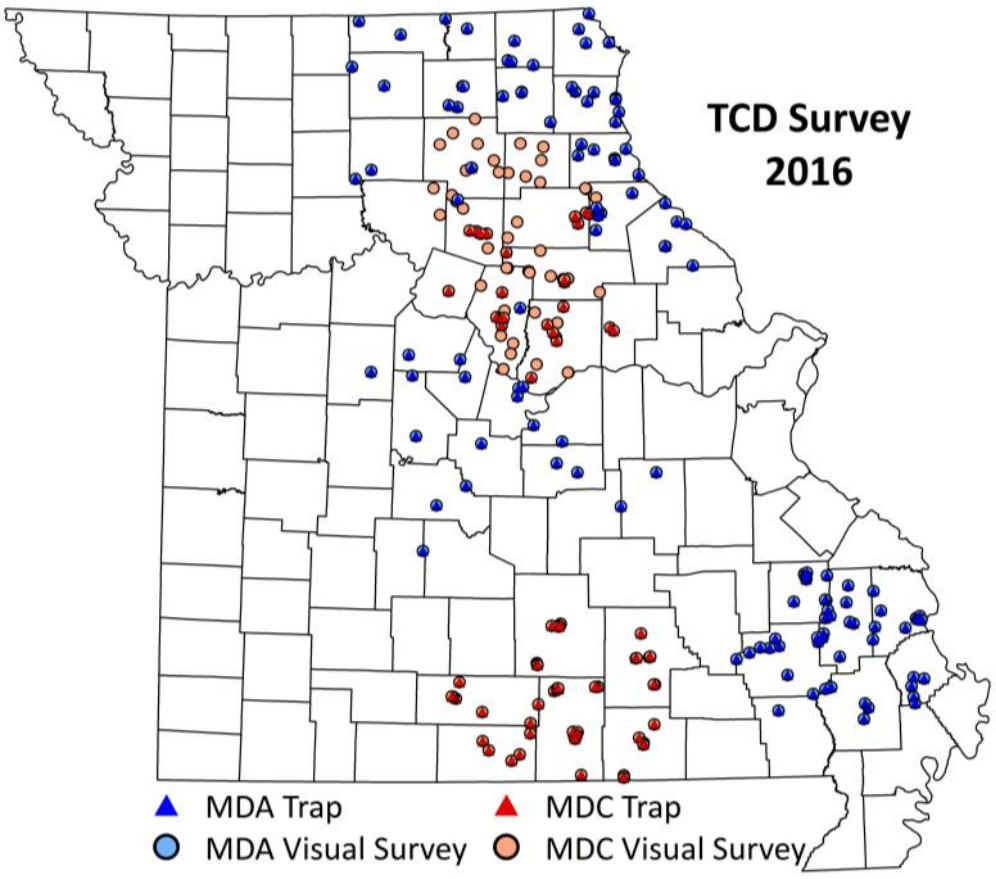
Symptoms of TCD include vigorous sprouts below crown dieback. Multiple trees may be affected. ***Photo: Whitney Cranshaw, Colorado State University, Bugwood.org***

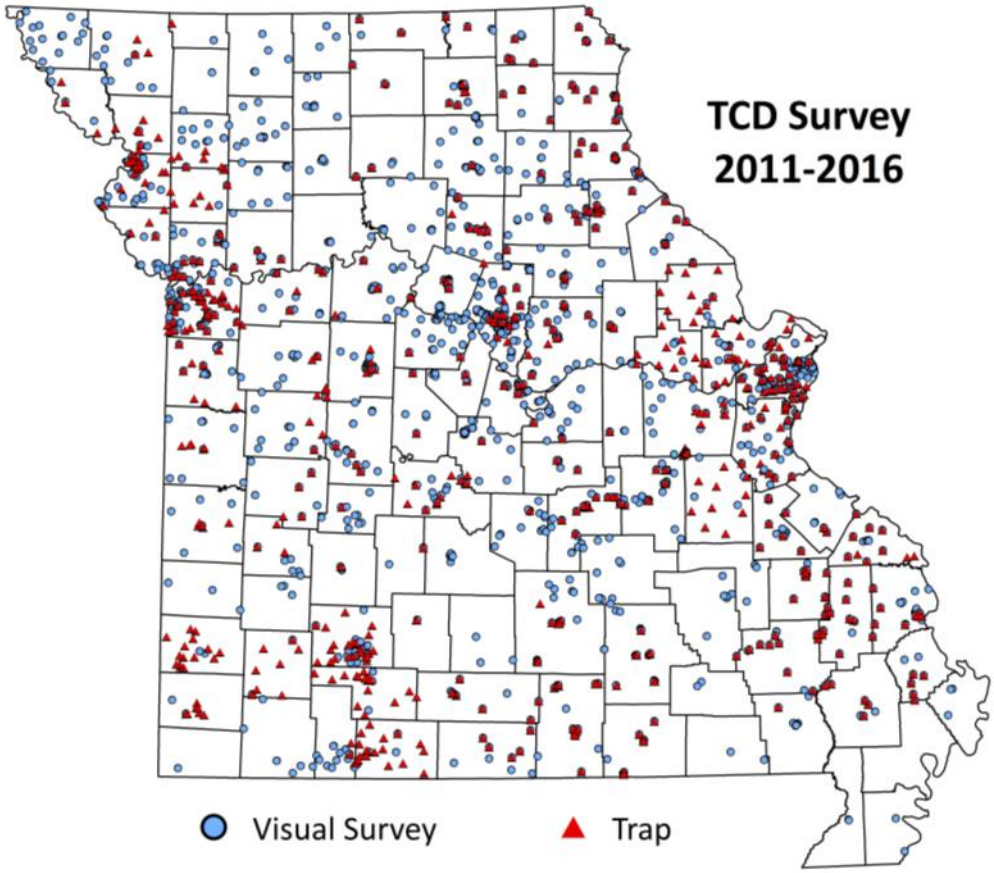
Thousand Cankers Disease *continued*

In 2016, both the Missouri Department of Conservation (MDC) and the Missouri Department of Agriculture (MDA) conducted surveys for TCD using USDA Forest Service and USDA APHIS Farm Bill funding, respectively. Survey activities this year include 196 walnut twig beetle traps in walnut trees or at sawmill log piles and 243 visual surveys to identify potentially infested trees in high-risk locations within 47 counties in northeastern, central, southcentral, and southeastern Missouri. Analysis is ongoing; however, no evidence of walnut twig beetle or *G. morbida* has been detected in 2016 samples.

Survey efforts are rotated to different regions each year. Since 2010, 1,809 locations have been surveyed visually and 814 WTB traps deployed. After extreme drought in 2012, subsequent survey activities identified many walnut trees with dieback and infestation by several wood-boring insects that commonly attack stressed walnut trees (primarily roundheaded and flatheaded borer larvae and ambrosia beetles). Observations of dieback were limited in 2016.

Walnut twig beetle trap. ***Photo: MDC***

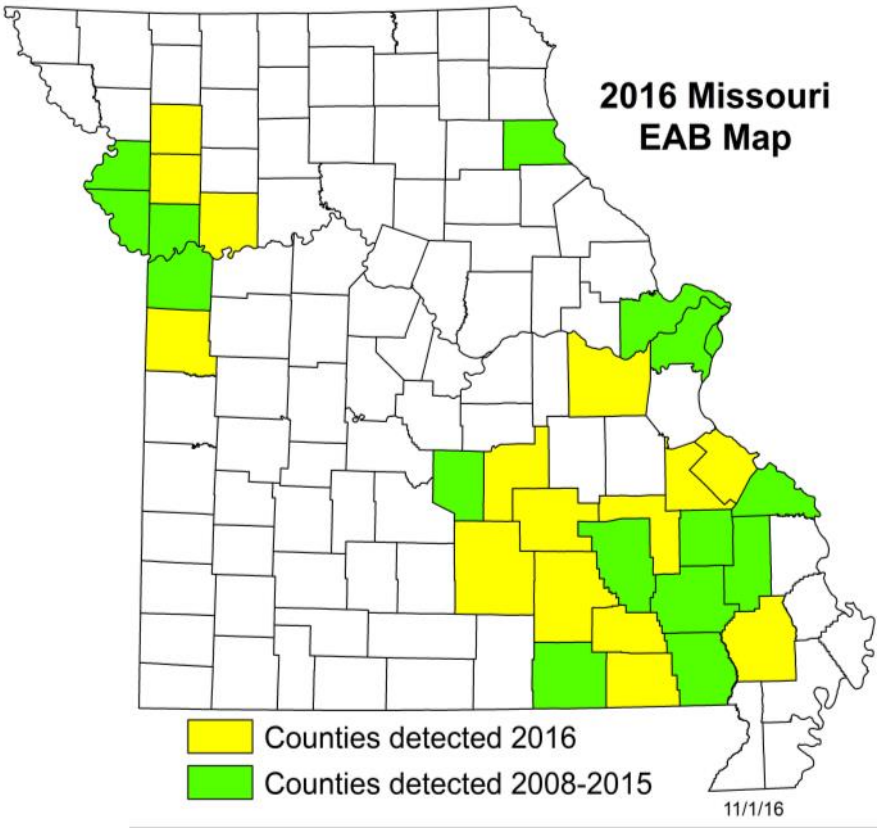




Emerald Ash Borers Detected in More Counties

The emerald ash borer (EAB), *Agrilus planipennis*, is an invasive beetle that has killed millions of ash trees in North America. It was initially discovered in the Detroit, Michigan area in 2002, but EAB likely entered that region a decade earlier via wood pallets and crating from China. EAB has now been detected in 30 US states and two Canadian provinces, stretching its range from Ontario to Texas and Colorado to North Carolina.

Missouri's first detection of EAB came in 2008 in Wayne County, near Lake Wappapello. Now 30 Missouri counties and the city of St. Louis are known to have EAB infestations. Fifteen of those county detections occurred during 2016. New detections in the southeastern part of the state include Carter, Dent, Iron, Phelps, Ripley, Shannon, Stoddard, St. Francois, St. Genevieve, and Texas counties. Closer to St. Louis, EAB was also detected in Franklin County, in the city of Sullivan. On the western side of Missouri, EAB was found for the first time in Cass, Clinton, DeKalb, and Ray counties this year.



The big increase in the number of EAB detections in 2016 is largely the result of many hours of visual surveys by the US Department of Agriculture (USDA) APHIS PPQ in southeast Missouri. USDA officers look for ash trees with branch dieback and bark "blonding" in late winter or early spring. Bark blonding is caused by woodpeckers searching for insect larvae inside the tree, popping off outer bark and revealing light-colored inner bark as they go. Ash trees with bark blonding may not have EAB, but it is certainly worth taking a closer look at those trees for this invasive pest. **Please report EAB suspects if they are in a new county where EAB has not yet been found.**

The Missouri Department of Agriculture, USDA APHIS PPQ, and University of Missouri monitored 232 purple prism traps in 41 counties throughout the state in 2016. Trap locations included high-risk areas like campgrounds and municipal yard waste facilities. EAB was captured on traps in two new counties this year—DeKalb and Franklin.

EAB populations can expand slowly on their own to new areas, but the primary way that EAB spreads over long distances is by hitchhiking on firewood. To slow the spread of EAB and other invasive forest pests, don't move firewood. Buy it as close as possible to the location you plan to burn it, or harvest firewood on site, if permitted.

Options are available to protect healthy, high-value ash trees from EAB. Please see details in the "*Emerald Ash Borer Management Guide for Missouri Homeowners*".

For more information or to report possible EAB, visit eab.missouri.edu.

Increased woodpecker activity leads to bark blonding, which can be a sign of EAB. ***Photo: MDC***

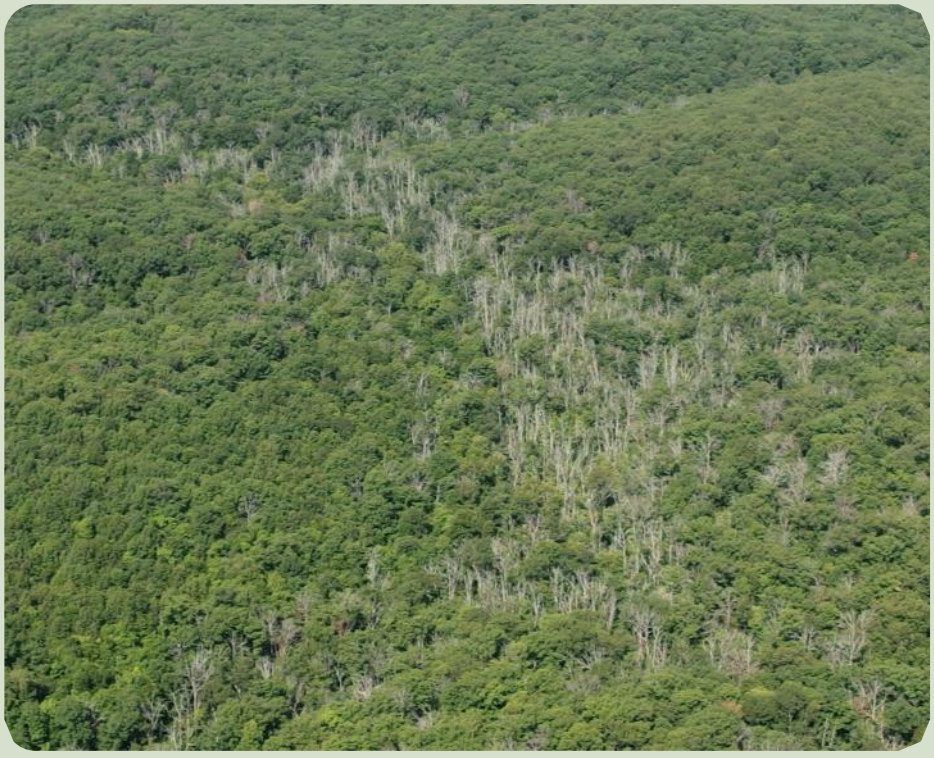
Rapid White Oak Mortality

White oak is important in Missouri due to its longevity, mast production for wildlife, and saw timber value (2 billion dollars). However, significant white oak mortality was reported in central, east central and southeast Missouri beginning in 2011. Unlike other common and well-studied patterns of oak decline and mortality in Missouri, this mortality disproportionately affects white oak, tree crowns die rapidly, and mortality is greatest on better quality sites for tree growth. Consequently, this phenomenon has been described as rapid white oak mortality (RWOM) to separate it from other oak decline patterns. RWOM reports were received from 45 Missouri counties on federal, state and private lands. Mortality appears to have peaked in 2012. Few reports of new mortality were received in 2016.

Research is ongoing by a team of University of Missouri researchers, including Dr. Sharon Reed, Dr. Jim English, Dr. Rose-Marie Muzika, Dr. Patrick Guinan, and Dr. John Kabrick (USDA-Forest Service) with USDA-Forest Service Forest Health Protection Evaluation Monitoring, MDC, and L-A-D Foundation funding. As of 2016, the team has established 54 research sites on MDC and Mark Twain National Forest lands in east central and southeast Missouri where they are collecting data on site and stand characteristics, measuring tree age and growth rates, and identifying associated insects and diseases.

Initial surveys indicate mortality occurs most frequently on lower slopes facing any direction and next to ephemeral or seasonal drainages. In the preliminary analysis of site characteristics, mortality was highest in areas with thin soils and high soil pH as well as locations that alternate between abundant soil moisture and dry soil conditions. These site types may indicate that soil moisture fluctuations played an important role in the development of RWOM. The preliminary analysis also suggests stocking levels (tree density) may not be related to the amount of damage observed.

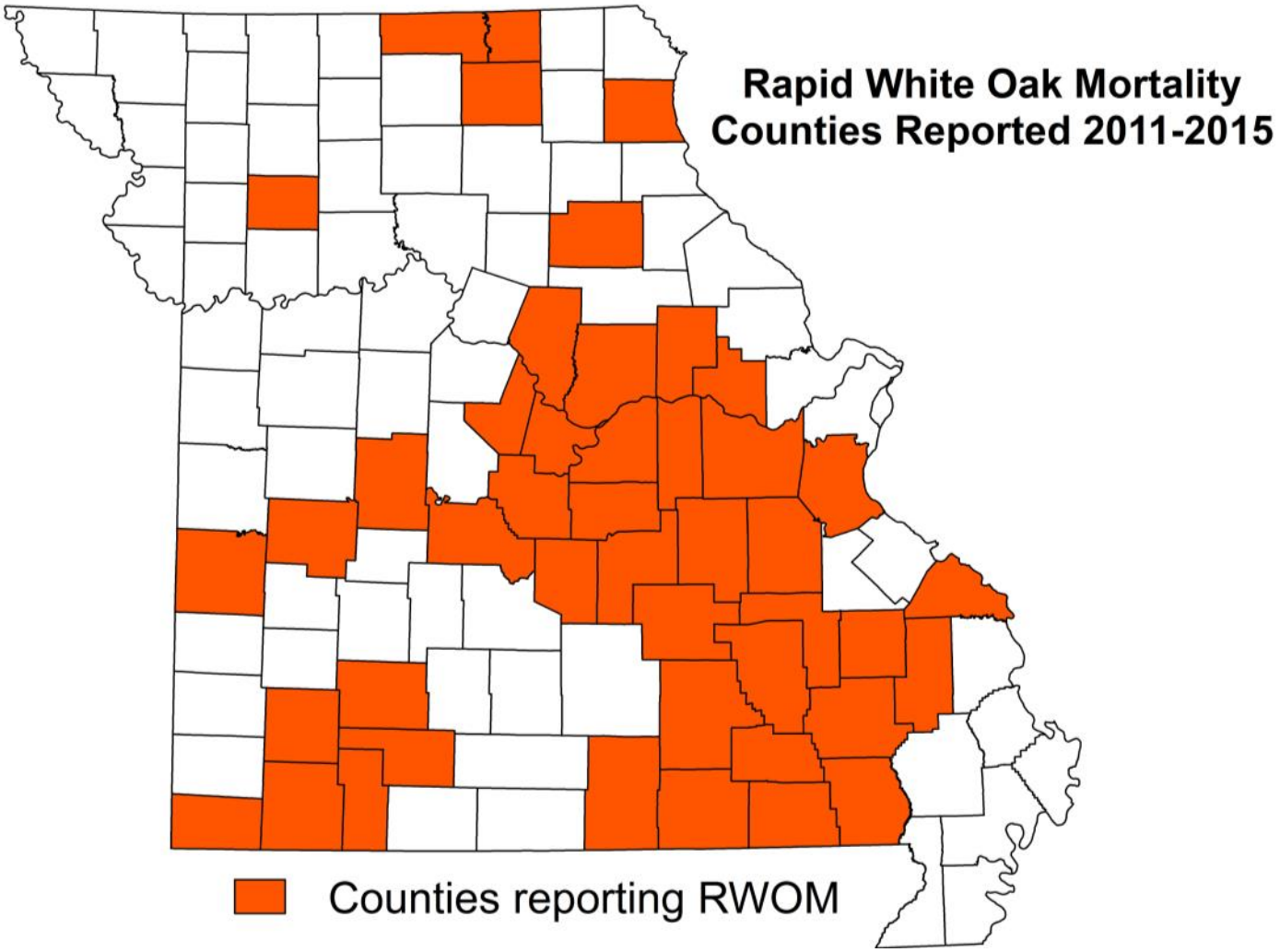
Large, dominant, overstory white oak trees are affected most often but many smaller trees also die. Affected white oak may not be very old; some dead trees at two sites were between 65 and 90 years old—similar in age to the healthy trees in the stand. More age-related studies are planned. Healthy and declining white oak trees remain in most affected stands, especially on mid and upper slopes. Observations of select trees at three RWOM-affected sites (Franklin, Shannon, and Washington counties) suggest tree crown vigor has changed little in the past year for a majority of trees. Healthy trees remained healthy and declining tree condition did not change.



RWOM pocket at Huzzah Conservation Area, Crawford County, MO.
Photo: MDC

Phytophthora cinnamomi, an exotic root rotting pathogen associated with similar white oak mortality patterns in eastern states, has been identified at nine sites in Crawford, Shannon, and Washington counties. Work is ongoing to identify *P. cinnamomi* and other pathogens in soil samples at other sites as well as additional fungi from affected trees. Other insects and diseases detected, including Hypoxylon canker, Armillaria root rot, and several wood boring insect species, primarily affect stressed trees.

Accumulated tree stress over several decades plays a role in the long-term health of trees. Limited tree ring analysis at two sites suggests that trees that died may⇨



RWOM continued

⇨have been affected more severely by weather extremes or other events causing tree stress than their living counterparts.

Our understanding of RWOM is improving but still limited. Because little new mortality has been observed in the past few years, preemptive harvesting is not recommended in healthy stands. In RWOM stands with dying trees, affected trees decay rapidly and should be harvested as soon as possible to avoid loss from decay or to prevent trees from becoming a hazard. RWOM may not be present in stands with only a few declining or dead white oaks, and these stands should be watched carefully prior to planning a harvest in response to RWOM.

Oak regeneration has been observed in RWOM stands but competition with shade tolerant species is common. Management of undesirable species may be necessary to maintain an oak component on affected sites. However, managers should also consider increasing stand diversity, especially on lower slopes and in drainages. Good stand management practices are recommended, although it may not prevent RWOM. New information over the next few years may help us better predict and manage locations with RWOM.

RWOM pocket at Pea Ridge Conservation Area in east central MO. ***Photo: MDC***

Japanese Beetles

Japanese beetles feeding on aromatic sumac. ***Photo: MDC***

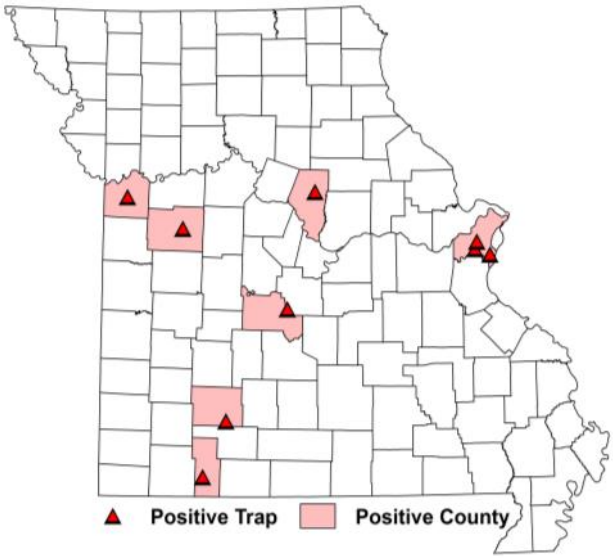
Most Missouri gardeners saw low levels of Japanese beetles following the severe drought of 2012. Since then, the relatively mild and wet weather conditions have allowed for a steady increase in Japanese beetle populations. This summer, people all over Missouri reported high numbers of the pest on a wide range of plants. Favorites included linden (basswood), elm, crabapple, sycamore, sassafras, plum, cherry, and bald cypress, as well as grape and rose.

Japanese beetles are capable of entirely defoliating mature trees, leaving behind lacy-looking, skeletonized leaves. Healthy, established trees can typically tolerate a heavy amount of feeding damage. However, this damage stresses trees, and multiple years of defoliation could cause long-term tree health issues. You can help your trees by watering them 2-3 times per month during dry times to avoid additional stress from drought. A good rule of thumb is 10 gallons per inch of a tree's diameter.

If your trees suffered extensive Japanese beetle damage in 2016, consider ways to protect them next summer. Keep an eye out for the beetles starting around mid-June. Prevent early feeding damage by handpicking beetles off small or newly planted trees. If populations are too high to remove by hand, spray an insecticide labeled to control Japanese beetles on your particular tree species. Repeat, if needed, at labeled intervals. Systemic insecticides, such as those containing imidacloprid, can be applied as a soil drench to protect some types of trees from Japanese beetles (**not allowed** on linden/basswood trees; follow all label restrictions). However, a large tree can take up to 6 weeks to translocate this chemical from soil to the leaves, so choose an appropriate application date before Japanese beetles arrive. **Insecticides, including systemic products, are not compatible with trying to maintain a pollinator-friendly yard and should never be used on flowering plants or trees that will attract bees and other pollinators.**

Drought conditions in July and August can lead to the death of many newly hatched Japanese beetle grubs. However, plenty of rainfall has occurred to keep the grubs alive across much of the state this past summer, which could lead to high populations in 2017. Fortunately, our upcoming winter may be a limiting factor to their survival. Japanese beetle grubs are killed when soil temperatures reach 15°F or when soils remain near 32°F for two months, but snow cover can significantly insulate soils from frigid air. A cold winter without much snow could greatly reduce next year's population.

Gypsy Moth Survey



The multi-agency Missouri Cooperative Gypsy Moth Program conducted its annual survey to detect the presence of gypsy moth (*Lymantria dispar*) by placing and monitoring 7,797 traps in 58 counties. Ten male European gypsy moths were captured statewide in 2016. Single male moths were captured in each of six counties: Boone, Camden, Greene, Jackson, Johnson, and Stone. Four moths were captured in St. Louis County, with two moths found in the same trap. During the 2017 survey, all nine capture sites will be intensively trapped to confirm no breeding populations of gypsy moth are present.

Fortunately, Missouri is not known to have any reproducing populations of gypsy moths. It is very easy, however, to transport gypsy moth egg masses to our state accidentally. Travelers returning from gypsy moth-infested states in July and August should examine vehicles and outdoor gear for tan, fuzzy egg masses. Please remove these masses before returning to Missouri.

Fall Webworm

Fall webworm (*Hyphantria cunea*) numbers were high again this year in several counties across Missouri. The heaviest populations were reported in the southwest part of the state, from Camden County south to the Arkansas border. Most reports were of the caterpillars on walnut trees, but other trees like persimmon, hickory, pecan, and sweetgum were also commonly defoliated. In some cases, entire trees were covered in webbing and stripped of their leaves, and callers reported hundreds of caterpillars crawling on house siding, decks, and sidewalks.

Heavy webbing by fall webworm on trees in the Springfield Botanical Center's Japanese Stroll Garden. ***Photo: MDC***

The webbing and defoliation caused by fall webworms may look devastating; however, it is mostly an aesthetic issue that likely won't affect tree health. Because the arrival of autumn means trees will be losing their leaves soon, defoliation late in the growing season causes much less stress on trees than similar damage in the spring. Maintaining good tree care practices, like watering trees when soils are dry and avoiding bark wounds, will go a long way in helping reduce stress on defoliated trees.

Control of fall webworm is rarely necessary. This species has many natural enemies from birds to parasitic wasps, which will likely reduce the population by next summer. However, if chemical control is needed next year, products containing Btk (*Bacillus thuringiensis kurstaki*), spinosad, acephate, or carbaryl can be used when webs first begin appearing in July and August. Be sure that chemical sprays penetrate the webbing. Use insecticides carefully to avoid impacts to beneficial insects. Never use fire to burn webs from trees as this can damage twigs and buds.

Jumping Oak Gall

Several counties around St. Louis, Springfield, and the Lake of the Ozarks reported moderate to heavy amounts of jumping oak gall on white and post oaks. The damage was often sporadic, with one tree being heavily infested while neighboring trees had low numbers of galls. Although entire tree crowns can turn brown, the infestation is not fatal to trees.

Jumping oak galls are caused by tiny, stingless wasps (*Neuroterus* sp.) that deposit their eggs on oak leaves in the spring. As the eggs hatch and the young wasp larvae begin feeding, the leaf tissue forms a button-like, pinhead-sized gall (abnormal growth) around each larva on the underside of the leaf. Most galls drop from the leaves in early summer. These fallen galls often "jump" due to vigorous movements of the larvae within, much like moth larvae of Mexican jumping beans. This behavior allows the galls to fall deeper into grass and leaf litter where they are sheltered throughout the coming winter.

White oak leaves damaged by jumping oak galls. ***Photo: MDC***

Jumping oak galls are present every year but often go unnoticed. The last major outbreak occurred across much of Missouri in 2010. Severe infestations of jumping oak galls can cause leaves to turn brown or black and fall prematurely from trees. This damage can stress trees, but good tree care practices will help their survival. For more information, see the Jumping Oak Gall Forest Health Alert.

Don’t Move Firewood!

Invasive, tree-killing pests can hitchhike in firewood, moving much farther with you in a single weekend than they could in years on their own. Insects and diseases can be very hard to detect in firewood since they are often concealed under bark. Even seasoned wood that has no obvious signs of bugs, holes, or sawdust can harbor insect eggs or fungal spores capable of starting a new infestation that destroys trees, decreases property values, and costs lots of money to manage. Pests that pose the biggest threat to Missouri forests include emerald ash borer, Asian longhorned beetle, gypsy moth, and thousand cankers disease of black walnut.

Missouri is currently under a statewide quarantine that restricts the movement of hardwood firewood out of the state as well as the importation of hardwood firewood from some states (check with the Missouri Dept. of Agriculture for details). At this time, it is legal to move firewood within the state, but officials strongly recommend not moving firewood more than 50 miles from where it was harvested to reduce the risk of spreading invasive pests. **Moving firewood less than 10 miles from its origin is best.**

For more information, visit treepests.missouri.edu and DontMoveFirewood.org.

Questions? Contact your local Resource Forester or Community Forester with the Missouri Department of Conservation.

Find contact information for your county at:

mdc.mo.gov

An electronic copy of this document can be found at mdc.mo.gov by searching “forest health news”.

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